TOTAL MAXIMUM DAILY LOAD PLAN

HULMEVILLE BOROUGH
BUCKS COUNTY, PENNSYLVANIA

NESHAMINY CREEK WATERSHED

SUB-WATERSHED
NESHAMINY CREEK SOUTH NO. 3 WATERSHED

April 25, 2016

TOTAL MAXIMUM DAILY LOAD STRATEGY

i TMDL Plan Title

Hulmeville Borough, Bucks County, Neshaminy Creek Watershed MS4 TMDL Plan

ii Watershed Names and Hydraulic Unit Codes

The Total Maximum Daily Load Assessment for the Neshaminy Creek Watershed in Southeastern Pennsylvania was prepared to address the impaired stream segments contained within the Neshaminy Creek watershed located in Bucks and Montgomery Counties, Pennsylvania. The assessment addressed impairments by sub-watersheds. Hulmeville Borough is located within the Neshaminy Creek South #3 watershed.

Neshaminy Creek	02040201
UNT to Neshaminy Creek	02040201

iii List of Pollutants and Waste Load Allocations (Neshaminy Creek South No. 3 watershed)

The Neshaminy Creek South No. 3 segment of the Neshaminy Creek was listed as being impaired due to siltation from development in the watershed and was assigned a WLA = 899,783 lbs. /yr.

iv Municipalities within the Neshaminy Creek South No. 3 watershed include:

Hulmeville Borough	Bristol Township
Penndel Borough	Bensalem Township
Middletown Township	

v Counties within the watershed:

The entire Neshaminy Creek watershed is located within Bucks and Montgomery Counties. The Neshaminy Creek South No. 3 watershed is located within Bucks County.

vi Allocated Pollutant Loading

The TMDL Assessment for the Neshaminy Creek Watershed includes a total watershed of 232 square miles (148,679 acres).

The Neshaminy Creek South No. 3 watershed encompasses an area of 2,837 acres, with a pollutant loading of 1,414,300 lbs./yr. of sediment.

Load allocation from Land Use	101,940 lbs./yr.
Load allocation from Stream Bank Erosion	1,312,360 lbs./yr.
Total Pollutant Load Allocation	1,414,300 lbs./yr.

Hulmeville Borough encompasses an area of 248 acres, approximately 8.7 percent of the Neshaminy Creek South No. 3 watershed. Therefore, the Borough allocated loading is 123,044 lbs./yr. of sediment. (0.087 * 1,414,300)

Load allocation from Land Use	8,869 lbs./yr.
Load allocation from Stream Bank Erosion	114,175 lbs./yr.
Total Pollutant Load Allocation	123,044 lbs./yr.

vii Reduction in Pollutant Loads

The Neshaminy Creek South No. 3 watershed specifies a total reduction in pollutant loading of 36 percent. Therefore, the target reduction for Hulmeville Borough is calculated at 44,296 lbs./yr. of sediment. (0.36 * 123,044)

Target reduction from Land Use	3,193 lbs./yr.
Target reduction from Stream Bank Erosion	41,103 lbs./yr.
Total Target Reduction	44,296 lbs./yr.

viii Control Measures and BMPs

The TMDL Assessment for the Neshaminy Creek Watershed indicates that stream bank erosion is the primary source of sediment for the sub-watersheds. Stream bank erosion accounts for approximately 93 percent of the sediment load in the Neshaminy Creek South No. 3 watershed.

The main stem of the Neshaminy Creek forms the southern municipal boundary of Hulmeville Borough, but the municipality only owns one (1) property along the creek, with an approximately frontage of 24 feet along the creek. With this limited frontage a stream stabilization project is not feasible. In addition, a project of this nature and scope is not within the Borough's budget or financial ability.

Hulmeville Borough consist primarily of residential properties and is essentially built-out. Resultant flow increases in waterways have been in place for easily over 50 to 75 years. Activities in the Borough may have unwittingly harmed the Neshaminy Creek in the past, but activities today are a very small component of the problems cited in the TMDL Assessment. The two main sources of sediment listed in the Assessment are cropland, of which Hulmeville Borough has none, and stream bank erosion, which is attributed to volume surges in the creek. Since approximately 94 percent of the watershed is located upstream from the Borough and the Borough only contributes 0.17 percent of the entire Neshaminy Creek watershed land area, the Borough is a very small contributor of siltation to the Neshaminy Creek. This said, Hulmeville Borough is committed to implementing actions which will reduce the volume of runoff to the Neshaminy Creek.

Sediment from transitional areas are addressed and reduced in the Borough by requiring erosion and sedimentation control facilities and stormwater management BMPs to control and mitigate increases in volume and peak flows. The Borough's Act 167 Stormwater Management Ordinance regulates the small amount of construction activity that occurs annually in the Borough.

The Borough intends to continue with its street sweeping program, leaf collection program and stormwater inlet cleaning to address sediment from low and high intensity development. The Borough will track materials removed by street sweeping and approximate the amount of material removed during the cleaning of facilities. Such activities will reduce sediment that might be generated from high and low intensity development.

The example TMDL measures presented in the permit instructions were each considered for applicability and use within Hulmeville Borough:

TMDL No. 1 Establish and Protect Riparian Forest Buffers – Restore vegetated buffer areas

As previously noted the Borough only owns 24 feet of wooded stream bank along the Neshaminy Creek. This is the only potential riparian buffer area that could be encumbered by an easement. All other stream banks within the Borough are located on private property. The Borough will encourage all streamside property owners to establish or re-establish buffer areas along the Neshaminy Creek. They will also provide educational material outlining the benefits of having a streamside buffer. However, it should be noted that most of the properties along the creek do not have the required 100 foot of buffer width to establish a riparian forest buffer.

TMDL No. 2 Disconnection Program – Disconnect impervious areas from your regulated small MS4 system

Based on an informal visual survey of certain sections of the Borough, it appears that there is little opportunity to disconnect roof leaders from impervious surface areas. Most homes in the Borough are already disconnected with downspouts discharging onto lawn areas. Some homes discharge onto impervious areas that cannot be disconnected, such as at a paved driveway/garage corner, or are significantly closer than 75 feet from the street or a driveway. The Pennsylvania Stormwater Best Management Practices Manual requires a minimum flow path of 75 feet before intersecting the impervious surface to generate a volume credit. This length of flow path is generally not achievable for residential properties in the Borough. Over the next permit term the Borough will conduct site inspections and prepare an inventory of properties that may be eligible for this credit.

TMDL No. 3 Tree Planting – Plant trees within the area that drains to the regulated small MS4

The Borough owns five (5) properties, along with the street rights-of-way, in which tree planting could be accomplished. The Hulmeville Garden Club has planted trees on Borough property and open space. The Borough will take credit for the seven (7) trees planted by the Hulmeville Garden Club to date. The Borough will also encourage private property owners to plant and preserve trees on their properties. The Garden Club offers to plant trees for residents who would like to honor family members. Private tree plantings will be documented and, based on the Pennsylvania Stormwater BMP Manual, will be credited at 6 cubic feet of runoff for each deciduous tree planted and 10 cubic feet of runoff for each evergreen tree planted.

TMDL No. 4 Construct Recharge/Infiltration Facilities

The Borough has constructed a rain garden at Borough Hall. However, the Borough has limited land area and financial resources in which to provide other infiltration facilities. The Borough will investigate the possibility of installing infiltration facilities at their other properties concurrent with future municipal facility improvements so that if funding becomes available these improvements could be made at these other properties.

TMDL No. 5 Stormwater Basin Retrofits – Naturalize or modify for extended detention, and/or modify basins for increased infiltration

There are no stormwater basins within Hulmeville Borough.

TMDL No. 6 Restore Stream Banks – Restore and/or stabilize degraded and eroded stream banks

As previously noted, the municipality only owns a 24 foot stretch of stream bank along the Neshaminy Creek. No significant benefit would be yielded by a restoration project at this location.

Due to the location of the municipality in the watershed, at the downstream end, any worthwhile stream bank restoration project would be extremely complicated and expensive to undertake.

TMDL No. 7 Establish Green Infrastructure at facilities that are owned by the Municipality and that drain into the regulated small MS4

Of the five (5) Borough owned properties, a rain garden already collects roof runoff from Borough Hall. Rain barrels will be installed at other downspouts on Borough Hall and another Borough owned property on Trenton Avenue to serve as a demonstration project for their residents. The other three (3) properties are a small pocket park with very limited impervious surface areas, a fully wooded lot and a narrow strip of grassed land with a sanitary sewer main running through it. However, the Borough will investigate the installation of rain gardens and other green infrastructure practices concurrent with future municipal facility improvements, pending funding opportunities.

TMDL No. 8 Develop and implement additional provisions to address TMDLs

Additional Borough efforts will fall under this category, as further described below:

Street Sweeping

Street sweeping has been chosen as one of the BMPs to minimize pollutant export to receiving waters. This practice is designed to remove sediment, debris and other pollutants from roads that are a potential source of pollution impacting waterways. Performance for street sweeping will vary depending on the frequency and type of equipment used. However, using the Mass Loading Approach within "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated," August 2014, from the Maryland Department of the Environment, a pollutant loading rate can be calculated by taking the actual amount of material collected, by weight, and then converting that to a dry mass by multiplying the total weight by 70 percent, then taking the dry mass and again multiplying it by 30 percent to arrive at the total sediment removal figure. This practice, along with other BMPS, should reduce the pollutant loads consistent with the waste allocation reduction established in the Neshaminy Creek TMDL.

Hulmeville Borough currently implements a twice a year (spring and fall) sweeping program utilizing a mechanical broom sweeper. This would allow the Borough to establish a baseline and determine the amount of waste collected. Using the baseline information the Borough would then evaluate the effectiveness of the program in reducing pollutant discharge loads. If required, the Borough would then update its MS4 TMDL Plan as necessary to assure that it meets its waste load reduction values.

Inlet Filters

The Borough will install filters in select stormwater road inlets to remove sediment, debris and other pollutants that are a potential source of pollution impacting waterways.

Storm Inlet Cleaning

The Borough will contract the clearing and cleaning of select Borough inlets at least annually. Utilizing the Mass Loading Approach found in the Maryland manual referenced above material removed will be tracked in order to establish a baseline and determine the amount of waste collected. Using the baseline information the Borough would then evaluate the effectiveness of the program in reducing pollutant discharge loads.

Rain Barrels on Privately Owned Property

The Borough will encourage all property owners to install at least one (1) rain barrel on their property. Standard residential rain barrels hold 50 gallons or 7 cubic feet of runoff, so the tabulated number of rain barrels multiplied by 7 will yield the flow volume removed by this program.

Leaf Pick-up

The Borough will continue its annual fall leaf pickup program.

ix Pollutant Load Reduction Analysis

Target Volume Reduction

Utilizing the volume reduction methods described above, the Borough has targeted a tabulated stormwater runoff reduction of 228 cubic feet for year one and 152 cubic feet for each year thereafter. The tabulation for year one will include rainwater harvesting or infiltration facilities that can be documented to have been installed on public or private property after 2003 (the year the Assessment was completed) and are in place and appear functional at the time of survey. The Borough will annually tally and report on rain barrels, rain gardens and trees put in place to reach this goal. Although we cannot directly correlate the numerical reduction in pounds of stream bank erosion on the Neshaminy Creek as a result of this volume removal, runoff volume is indicated in the report to be the causal factor in stream bank erosion, the primary source of sediment loading in the watershed.

Target Sediment Reduction

Tracking materials removed by street sweeping, inlet filters, inlet cleaning and leaf pickup, the Borough intends to continue these activities to remove 2,015 pounds of sediment and suspended solids annually that would otherwise be carried to the Neshaminy Creek. This achieves approximately 63.1 percent of the desired reduction in non-stream bank erosion sediment loads.

4/25/16

Mario L. Canales, P.E. Date

TOTAL MAXIMUM DAILY LOAD DESIGN DETAILS

TMDL No. 3 Tree Planting

The Hulmeville Garden Club has planted 3 trees in open space areas and 4 trees on Borough property. The Garden Club will be planting 3 trees in 2016 and is committed to plant 2 trees per year thereafter. Based on the Pennsylvania Stormwater BMP Manual trees will be credited at 6 cubic feet of runoff for each deciduous tree planted and 10 cubic feet of runoff for each evergreen tree planted.

Existing Reduction:	7 trees x 6 cubic feet of runoff per year = 42 cubic feet of runoff per year
2016 Reduction:	3 trees x 6 cubic feet of runoff per year = 18 cubic feet of runoff per year
Future Reduction:	2 trees x 6 cubic feet of runoff per year = 12 cubic feet of runoff per year

At the end of 2016 it is estimated that 60 cubic feet of runoff would have been removed from the Neshaminy Creek South No. 3 watershed. This number would then be increased by approximately 12 cubic feet of runoff each subsequent year.

The Borough will be responsible for the maintenance of the trees planted in the open space and Borough Property. Trees planted on private property will be maintained by the individual property owner.

TMDL No. 4 Construct Recharge/Infiltration Facilities – Rain Garden

As a demonstration project the Borough, in 2012 installed a rain garden at Borough Hall, 321 Main Street. The rain garden services a portion of Borough Hall's roof area. Two (2) downspouts from the roof are directed to the rain garden. The load reduction from this BMP is calculated as follows:

Drainage Area = 700 square feet = 0.016 Acres

From the Neshaminy Creek South No. 3 section of the Neshaminy Creek Watershed TMDL Assessment the Unit Area Loading Rate for Low Intensity Development = 20.8 lbs./acres/year

Rain Garden Load Rating = 0.016 acres x 20.8 lbs./acre/year = 0.33 lbs./year

From the Pennsylvania Stormwater Best Management Practices Manual the efficiency rating for Rain Gardens is 85 percent

Rain Garden Load reduction = 0.33 lbs./year x 0.85 = 0.28 lbs./year

Since the Borough is the land owner, they are the responsible entity for the operation and maintenance, as well as inspection, of the rain garden. The rain garden inspection, operation and maintenance requirements and procedures are as follows:

As needed	Water plants unless rainfall is adequate. Prune and weed to maintain appearance and plant survival. Replace mulch. Remove trash and debris. Replace vegetation whenever cover of acceptable vegetation falls below acceptable levels.

Semi-annually	Inspect inflow and outflow points for clogging; remove any sediment and deposits. Inspect for erosion or gullying as necessary. Evaluate the health of plant material and replant as appropriate to meet project goals. Remove and replace any dead or severely diseased vegetation. Cut back and remove previous year's plant material and remove accumulated leaves, if needed.

TMDL No. 8 Develop and implement additional provisions to address TMDLs

Rain Barrels

In the permit year after DEP approval of the TMDL Plan the Borough will install rain barrels at 2 downspouts at Borough Hall and 2 downspouts at a second Borough owned property at 114 Trenton Avenue. Based on 50 gallon rain barrels, 7 cubic feet of runoff will be removed per barrel.

Reduction at Borough Hall and second Borough property:

4 rain barrels x 7 cubic feet of runoff = 28 cubic feet of runoff per year

In the permit year after DEP approval of the TMDL Plan the Borough will also implement a Rain Barrel Encouragement Program. The goal of the program is to have 20 homes per year install rain barrels. The program will encourage homeowners to participate by offering one (1) free rain barrel in exchange for attending a presentation on rain barrel maintenance and overall stormwater stewardship. Additional rain barrels would be available from the Borough to those attending the presentation at a reduced cost.

Rain Barrel Encouragement Program

20 rain barrels x 7 cubic feet of runoff = 140 cubic feet of runoff per year

At the end of the first year it is estimated that 168 cubic feet of runoff would have been removed from the Neshaminy Creek South No. 3 watershed. This number would then be increased by approximately 140 cubic feet of runoff each subsequent year.

To assure proper inspection, operation and maintenance is accomplished, the Borough will maintain the public rain barrels. Rain barrels on private property will be maintained by the individual property owner. These individuals will receive a letter and educational material in the mail each year reminding them that they are required to conduct regular inspection and maintenance activities and that they must provide an annual report to the Borough verifying that these activities were completed. The rain barrel inspection, operation and maintenance requirements and procedures are as follows:

April through November	Remove leaves and debris. Maintain water drainage.
April and November	Conduct seasonal preparations.

Street Sweeping

The Borough is proposing to continue their two (2) times per year street sweeping program. It is anticipated that the sweepings will occur in the spring and fall of each year. In addition, the Borough performs street sweeping, as required, at specific locations after large storm events.

Based on criteria established in "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated," August 2014, from the Maryland Department of the Environment, a pollutant loading rate can be calculated using a Mass Loading Approach. For this approach one would take the actual amount of material collected, by weight, and then convert that to a dry mass by multiplying the total weight by 70 percent, then taking the dry mass and again multiplying it by 30 percent to arrive at the total sediment removal figure. Since December of 2013 the Borough has swept as follows:

Dec. 2013	7,400 lbs. of material swept x 0.70 = 5,180 lbs. dry weight x 0.30 = 1,554 lbs. of sediment removed.
May 2014	3,780 lbs. of material swept x 0.70 = 2,646 lbs. dry weight x 0.30 = 794 lbs. of sediment removed.
May 2015	2,780 lbs. of material swept x 0.70 = 1,946 lbs. dry weight x 0.30 = 584 lbs. of sediment removed.
Dec. 2015	5,000 lbs. of material swept x 0.70 = 3,500 lbs. dry weight x 0.30 = 1,050 lbs. of sediment removed.

Averaging the above values the Borough anticipates a sediment load reduction of 996 lbs. of sediment per sweeping or 1,991 lbs. of sediment removed per year.

Inlet Filters

In the permit year after DEP approval of the TMDL Plan the Borough will install 5 filters within existing road stormwater inlets. The load reduction from this BMP is calculated as follows:

Assumed drainage area to inlet = 0.25 acres

From the Neshaminy Creek South No. 3 section of the Neshaminy Creek Watershed TMDL Assessment the Unit Area Loading Rate for Low Intensity Development = 20.8 lbs./acres/year

Inlet Filter Load Rating = 0.25 acres x 20.8 lbs./acre/year = 5.2 lbs./year

From industry literature the efficiency rating for the inlet filter is 99 percent, however for conservative purposes we will use an efficiency factor of 90 percent.

Inlet Filter Load reduction = 5.2 lbs./year x 0.90 = 4.7 lbs./year per filter

Total Inlet Filter Load reduction = 4.7 lbs./year x 5 filters = 23.5 lbs./year

The Borough will be the responsible entity for the operation and maintenance, as well as inspection, of the inlet filters. The inlet filter inspection, operation and maintenance requirements and procedures will be in accordance with the filter manufacturer's specifications.

Storm Inlet Cleaning

In the permit year after DEP approval of the TMDL Plan the Borough will contracted with an independent contractor to inspect and clean 17 storm sewer inlets per year. These cleanings will occur during the spring or fall of each year.

Utilizing the Mass Loading Approach found in the Maryland manual referenced above material removed will be tracked in order to establish a baseline and determine the amount of waste collected.

Leaf Pickup

The Borough will continue its annual fall leaf pickup program. Curb side pickup of leaves are performed by the Borough's waste hauler on five (5) separate days in the fall and early winter of each year. The five (5) pick-up dates are advertised annually by the Borough and the waste hauler.